Claims

I claim:

1. An switching device comprising a macrocyclic molecule arrangement in at least one of a substantially one dimensional stack arrangement or a two dimensional arrangement, said arrangement being adsorbed on a substrate.

2. The device of claim 1, said arrangement being adsorbed on a metal substrate.

3. The device of claim 1, said arrangement being adsorbed on a semiconductor substrate.

4. The device of claim 1, wherein macrocyclic molecules in said arrangement are metallated.

5. The device of claim 4, wherein the metallated macrocyclic molecules include one or more metals selected from the group cobalt, iron, copper, nickel, silver, gold, palladium, platinum, aluminum.

6. A memory device comprising a macrocyclic molecule arrangement in at least one of a substantially one dimensional stack arrangement or a two dimensional arrangement, said arrangement being adsorbed on a substrate.

7. An information storage and retrieval apparatus comprising the memory device of claim 6, and further comprising an input to apply optical or electrical input, and a detector to detect the output or response from the memory device.

8. The apparatus of claim 7, said detector comprising a nuclear magnetic resonance device.

9. The apparatus of claim 7, further comprising an output for producing a signal representative of the response of the detector to the memory device.

10. The apparatus of claim 7, said detector comprising a tunneling microscope.

11. A reversible quantum switch with multiple outputs, comprising the switching device of claim 1.

12. The switching device of claim 1, said arrangement of macrocyclic molecules comprising metallated macrocyclic molecules.

13. The switching device of claim 11, said metallated macrocyclic molecules comprising metallo-phthalocyanine molecules.

14. The switching device of claim 11, said arrangement of macrocyclic molecules comprising silicon phthalocyanine.

15. A method of obtaining multiple outputs from a switching device, comprising applying an input to an arrangement of macrocyclic molecules in at least of a substantially one dimensional stack-like or ring-like structure or a substantially two dimensional sheet-like structure, and responding to multiple outputs.

16. The method of claim 15, said responding comprising detecting optical response using a Raman spectrophotometer.

17. The method of claim 15, said responding comprising detecting response using nuclear magnetic resonance.

18. The method of claim 15, said responding comprising detecting response using a tunneling microscope.

19. A molecular/quantum device, comprising a monomeric metallated phthalocyanine that behaves as a fast ($< 10^{-12}$ second), energy efficient (3OkT/bit of information), fully reversible quantum switch with multiple outputs, wherein the monomeric phthalocyanines are organized in structural combinations of at least one of one dimensional wire-like ring-stacked, or two dimensional sheet-like ring-fused phthalocyanines.

20. The device of claim 19, wherein the functionality of the molecular metallated phthalocyanine behaves with properties that can replace a multiplicity of CMOS and similar classic semiconductor devices.

21. The device of claim 1, wherein the phthalocyanine molecules, as molecular monomeric units or in general electrochemically semi-organized forms, can provide a electro-optical properties including at least one of fast switching effect, multilevel logic, memory states.

22. The device of claim 1, wherein the phthalocyanine molecules can form basically three structural forms.

23. The device of claim 22, wherein the phthalocyanine molecule forms include monomeric molecular units or a polymeric combination as one dimensional ring-stacked "wire" like structure and two dimensional ring-fused "sheet" structures.

24. The device of claim 23, wherein each of the three basic structures can have various metals (cobalt, iron, copper, nickel, silver, gold, palladium, platinum, aluminum) in the center of the molecule.

25. The device of claim 1, wherein the phthalocyanine structures are in the form of a monomer.

26. The device of claim 1, wherein the phthalocyanine structures are in the form of a ring stacked.

27. The device of claim 1, wherein the phthalocyanine structures are in the form of a monomer polymer sheet.

28. The device of claim 1, comprising ring-stacked silicon phthalocyanine with a base on the order of 1 x l nm and length which depends on the number of molecules.

29. A method of making a molecular/quantum device, comprising a monomeric metallated phthalocyanine that behaves as a fast, energy efficient, fully reversible quantum switch with multiple outputs, wherein the monomeric phthalocyanines are organized in structural combinations of at least one of one dimensional wire-like ring-stacked, or two dimensional sheet-like ring-fused phthalocyanines, comprising tailoring number of peaks in a cyclic voltammogram representation of operation of the device according to the number of stacked rings in the "wire."

30. A method of making a quantum electro-optical device, comprising arranging a plurality of macrocyclic molecules in a substantially one dimensional ring-like stace or in a substantially two dimensional sheet-like arrangement, and adsorbing the same to a conductor or semiconductor substrate.